

Origination Date: 9/06	Revision Date(s): 9/07, 9/08
Developed By: Medical Criteria Committee	

Csaba Mera, MD

Approved: Csaba Mera, MD

Date: 9/26/08

Description:

Stereotactic radiosurgery (SRS) is a procedure in which no incision is made but rather three-dimensional images are utilized to direct precisely focused radiation to obliterate abnormal tissues. Because it is so precise, SRS allows a higher dose of radiation to be given to the target tissue with minimal exposure to surrounding healthy tissue. SRS also has advantages over open surgery in that it is not as invasive and can address lesions that are difficult to access as well as multiple lesions. The major disadvantages to SRS are that it is generally used for smaller lesions and it results in slow tumor shrinkage over weeks or months rather than relieving mass effect immediately.

Fractionated or staged SRS is also known as stereotactic radiotherapy (SRT). This is a process in which the total dose of stereotactic radiation is divided into several smaller doses given on separate days. The difference between SRS and SRT is that in SRS, radiation is delivered at a high intensity in one treatment generally to a smaller area; while in SRT, radiation is administered in several treatments at lower intensities to larger areas. The main advantage to fractionated radiotherapy is that it allows higher doses of radiation to be delivered to the tumor due to the increased tolerance of the surrounding normal tissues to these smaller fractionated doses. Fractionated SRS outside of the head is also known as stereotactic body radiation therapy (SBRT).

There are three forms of stereotactic radiosurgery represented by three different technological instruments. Each instrument operates differently and has a different source of radiation. The three are:

Cobalt-60 based: These machines use gamma rays from radioactive cobalt-60 sources that focus on the tumor using 201 multiple small beams. They provide extremely accurate targeting and precise treatment of brain tumors. They are dedicated to treating benign or malignant intracranial lesions, lesions near or involving the base of the skull, and functional disorders of the brain in a one-day treatment. The cobalt-60 based SRS machine is also known as the Gamma Knife. The Gamma Knife does not move during treatment and the patient is immobilized with a head frame, thus providing a high degree of precision within the brain. These machines are ideal for smaller tumors and for treating functional disorders of the brain.

Linear accelerated based: These machines use a single beam of x-rays, rotated to produce multiple intersecting beams. Linear accelerator machines can be used to deliver fractionated treatment over several sessions and are able to use a larger x-ray beam, which enables them to treat larger tumors. Linear accelerator based machines are not dedicated to just treatments within the brain. They can be used for treatment throughout the body as well as the head and neck. The machines are made by several manufacturers and have brand names such as X-Knife, SynergyS, Trilogy, Novalis, and CyberKnife.

Particle beam (proton, neutron or helium-ion): Particle beam units are in limited use in the United States. These machines can be used to treat larger and more irregularly shaped lesions. Particle beams have a physical advantage over gamma and x-rays when it comes to sparing normal tissue in that they deposit most of their radiation energy at the Bragg peak. The Bragg peak is the region of greatest radiation dose deposition. The energy can be precisely controlled to cause the Bragg peak to fall within the tumor or target tissue. In addition to brain tumors, particle beams also treat body cancers in a fractionated manner.

Origination Date: 9/06	Revision Date(s): 9/07, 9/08
Developed By: Medical Criteria Committee	

Criteria:

- I. ODS will cover single treatment or fractionated stereotactic radiosurgery on a case-by-case basis. The following indications may be considered medically necessary for treatment with a Cobalt-60 or linear accelerated based machine:
 - A. Arteriovenous malformation (AVM)
 - B. Acoustic neuroma
 - C. Pituitary adenoma
 - D. Meningiomas (non-resectable, residual, or recurrent)
 - E. Solitary or multiple brain metastases in patients having good performance status and no active systemic disease
 - F. Primary malignancies of the CNS, including but not limited to high-grade gliomas (initial treatment or treatment of recurrence)
 - G. Trigeminal neuralgia refractory to medical management or in cases where the patient is unable to tolerate the side effects of medications
 - H. Inoperable spinal tumors with compression or intractable pain
 - I. Disabling tremor in patients with Parkinson's disease who are not candidates for alternative procedures
 - J. Severe essential tremor that is unresponsive to traditional medical therapy
 - K. Stereotactic body radiation therapy (SBRT) using a gamma knife or linear accelerator machine for the treatment of localized malignant conditions within the body where highly precise application of high-dose radiotherapy is required, may be considered medically necessary. These cases will be reviewed on a case-by-case basis by the ODS Medical Director.

- II. Treatment with a particle beam (proton or helium ion) will be reviewed on a case-by-case basis by the ODS Medical Director and may be considered medically necessary for the following indications:
 - A. Primary therapy for melanoma of the uveal tract (iris, choroids, or ciliary body) that is not amenable to surgical excision of other conventional forms of treatment
 - B. Inoperable intracranial arteriovenous malformations
 - C. Primary therapy of clinically localized prostate cancer
 - D. Chordomas or chondrosarcomas arising at the base of the skull or along the axial skeleton without distant metastases
 - E. Pituitary tumors
 - F. Meningiomas
 - G. Other central nervous system tumors located near vital structures of the brain in which conventional treatments may cause significant risk

- III. Stereotactic radiosurgery or stereotactic radiotherapy is considered investigational for any of the following:
 - A. Any other indication not listed above
 - B. Treatment of functional disorders other than trigeminal neuralgia, such as epilepsy, chronic pain, and headaches
 - C. Neuro-psychological conditions
 - D. Treatment with neutron beam radiation therapy

Information to be Submitted with Pre-Authorization Request:

- History and physical from treating physician
- Diagnostic study reports
- Treatment history (i.e. radiation, chemotherapy, surgery, etc)
- Treatment plan

Origination Date: 9/06	Revision Date(s): 9/07, 9/08
Developed By: Medical Criteria Committee	

References:

- Ernst-Stecken A, Ganslandt O, Lambrecht U, et al. Phase II trial of hypofractionated stereotactic radiotherapy for brain metastases: results and toxicity. *Radiother Oncol.* 2006 Sep 13.
- Gorgulho AA, De Salles AA, et al. Impact of radiosurgery on the surgical treatment of trigeminal neuralgia. *Surg Neurol.* 2006 Oct;66(4):350-6.
- Devisetty K, Chen LF, Chmura SJ. Evolving use of radiotherapy and radiosurgery in the treatment of pituitary adenomas. *Expert Rev Anticancer Ther.* 2006 Sep;6Suppl 9:S93-8.
- Weber DC, Bogner J, Verwey J, et al. Proton beam radiotherapy versus fractionated stereotactic radiotherapy for uveal melanomas: A comparative study. *Int J Radiat Oncol Biol Phys.* 2005 Oct1;63(2):373-84.
- Knisely JP, Linskey ME. Less common indications for stereotactic radiosurgery or fractionated radiotherapy for patients with benign brain tumor. *Neurosurg Clin N Am.* 2006 Apr;17(2):149-67.
- Combs SE, Thilmann C, Debus J, et al. Long-term outcome of stereotactic radiosurgery (SRS) in patients with acoustic neuromas. *Int J Radiat Oncol Biol Phys.* 2006 Apr 1;64(5):1341-7.
- Chang SD, Lee E, Sakamoto GT, et al. Stereotactic radiosurgery in patients with multiple brain metastases. *Neurosurg Focus.* 2000 Aug 15;19(2)e3.
- Henderson MA, Shirazi H, Lo SS, et al. Stereotactic radiosurgery and fractionated stereotactic radiotherapy in the treatment of uveal melanoma. *Technol Cancer Res Treat.* 2006 Aug;5(4):411-9.
- Selch MT, Gorgulho A, Lee SP, et al. Stereotactic radiotherapy for the treatment of pituitary adenomas. *Minim Invasive Neurosurg.* 2006 Jun;49(3):150-5.
- Andrews DW, Scott CB, Sperduto PW, et al. Whole brain radiation therapy with or without stereotactic radiosurgery boost for patients with one to three brain metastases: phase III results of the RTOG 9508 randomized trial. *Lancet* 2004 May 22;363(9422):1665-72.
- Stereotactic radiosurgery for epilepsy. *Hayes Alert – Technology Assessment Brief.* March 2003;6(3).
- Radiosurgery has surgical effect on target area. *Another Perspective IRSA.* Volume 4(2);ISSN 1086-427X. Accessed on September 7, 2007 at URL address: www.irsa.org.
- Duma CM, Jacques DB, Kopyov OV, et al. Gamma knife radiosurgery for thalamotomy in parkinsonian tremor: a five-year experience. *J Neurosurg.* 1998 Jun;88(6):1044-9.
- Physician Advisors